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DESIGNING LEARNING MEDIA OF CONTROL BASED ON MICRO CONTROLLER 8051 BY USING THE MCU 8051 IDE TO SUPPORT THE IMPLEMENTATION OF ACTIVE LEARNING IN HIGHER EDUCATION-ALFHE (ACTIVE LEARNING FOR HIGHER EDUCATION)

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ABSTRACT

On this occasion, the author discusses the development of instructional media of microcontroller 8051-based control teaching using a simulator called MCU 8051 IDE on Windows 7 (MCU 8051 IDE runs on various operating systems) to support the implementation of active learning in higher education. The developed Learning Media is in the form of simulation control program (in assembly language). This simulator can be downloaded for free at sourceforge.net site [3]. According to the writer's observation the developed simulation program has been stable and successful in increasing the participation and engagement of the students in the learning process, allowing the teacher to apply their teaching strategies and successfully overcome the lack of funds to meet the need for equipments in supporting active learning[6]. The simulation program has also been successful in reducing errors in developing or manufacturing the real equipment (reducing costs).

KEYWORDS: Control Based on Micro Controller 8051, MCU 8051, Windows 7 (MCU 8051 IDE

INTRODUCATION

Preface

Based on the author's experience in teaching at college, the authors see the need for a changing in teaching methodologies (Instructional Strategy of teaching) in order to increase the success rate of teaching and learning; transforming conventional learning methodologies (teacher as central or learning resources) to the active teaching methodologies or Active Learning Methodology (students as a learning center). The application of active learning strategy has demonstrated significant efficacies compared to conventional learning [1] [2].

Active learning strategy has been shown to increase the participation and student engagement (reduction in stress level of the students and teachers) in the classroom and increasing students' learning desire and finally produce more innovative students; students are given more freedom to try new things by using innovative and interactive teaching media.

They use the simulator before starting developing or manufacturing real equipment; the implication is the decrease of the production costs. One of the strategies in the application of active learning is the use of instructional media

in the process of teaching and learning. At this time there are various microcontroller simulator 8051 learning that can be downloaded for free and can then be used as a media of learning in the application of active learning [3][4].

The author used the simulator MCU 8051 IDE to develop microcontroller 8051-based control simulator that runs over Windows 7 operating system. The programming language used in the development of this program was assembly language 8051 and used out and input visual hardware that had been provided by the simulator.

The visual output Hardware displayed output information based on the information received at the visual input hardware and to the assembly language program built on visual tools of course. The author hopes that this simulator will contribute to the development of science, particularly in computer science and microcontroller and computer-based control system and engineering and can also be used in higher education as a media of teaching in active learning class and can further inspire the teachers to create a variety of other media by utilizing the MCU 8051 IDE simulator.

Main

Figure 1 below shows the result of a print screen of the GUI (Graphical User Interface) of 3 pieces of visualized hardware (port 0 as an input and port 1 and 2 as output). Port 0 (P0) connected with a simple switch structure (A-H). Each pin on the switch P0 (P0.0-P0.7) are independent and are toggle switch, when the switch is pressed, the switch will be connected to GND and if pressed again then the corresponding switch will open (logic "1"). In this article only one piece of input simulator switch is used as a sensor or transducer. Switch used is the switch labeled with "A" and is connected with P0.0.

As mentioned earlier there are two types of visualized output of the simulator, the seven segment display and LED. The Seven Segment Display used is a Common Anode type (Anode pin of each segment are linked together and connected to the 5 V DC voltage source, each segment will light up if the cathode pin of Seven Segment Display connected with Port 1 is connected to a GND).

A Seven Segment Display is used only for displaying the character in the form of the letter "H" when the sensor at (P0.0-switch "A") get a logic "0" input and in reversed displays a character in the form of the letter "L" when the sensor obtained a logic "1" input[5].

As mentioned before the final visualized output device is a common anode LED (Light Emitting Diode) structure. Anode pin of the LED structure are connected together with 5 V DC voltage source and a cathode of a LED is connected to the port 2.

This simulator only used a LED as a display; LED that is connected to P2.0. LED connected with P2.0 will turn on (connected to GND) only if P0.0 sensor obtain a logic "0" input and in reverse will be turn off (disconnected from GND) if the sensor connected to P.0.0 obtain a logic “1” input.

To display a character of the letter "H" see figure 1 two macro instructions are used; macro “padam” and macro “high” as shown in the instructions below. In contrast to display the character "L" see figure 2 macros “padam” and macro “low” are used. To turn on the LED at P2.0 see figure 1 CLR P2.0 instruction is used, in the contrary to turn off the LED see figure 2 instruction SETB P2.0 is used.

Figure1: Print Screen of GUI Displaying a Character of H

Figure 2: Print Screen GUI Displaying a Character of L

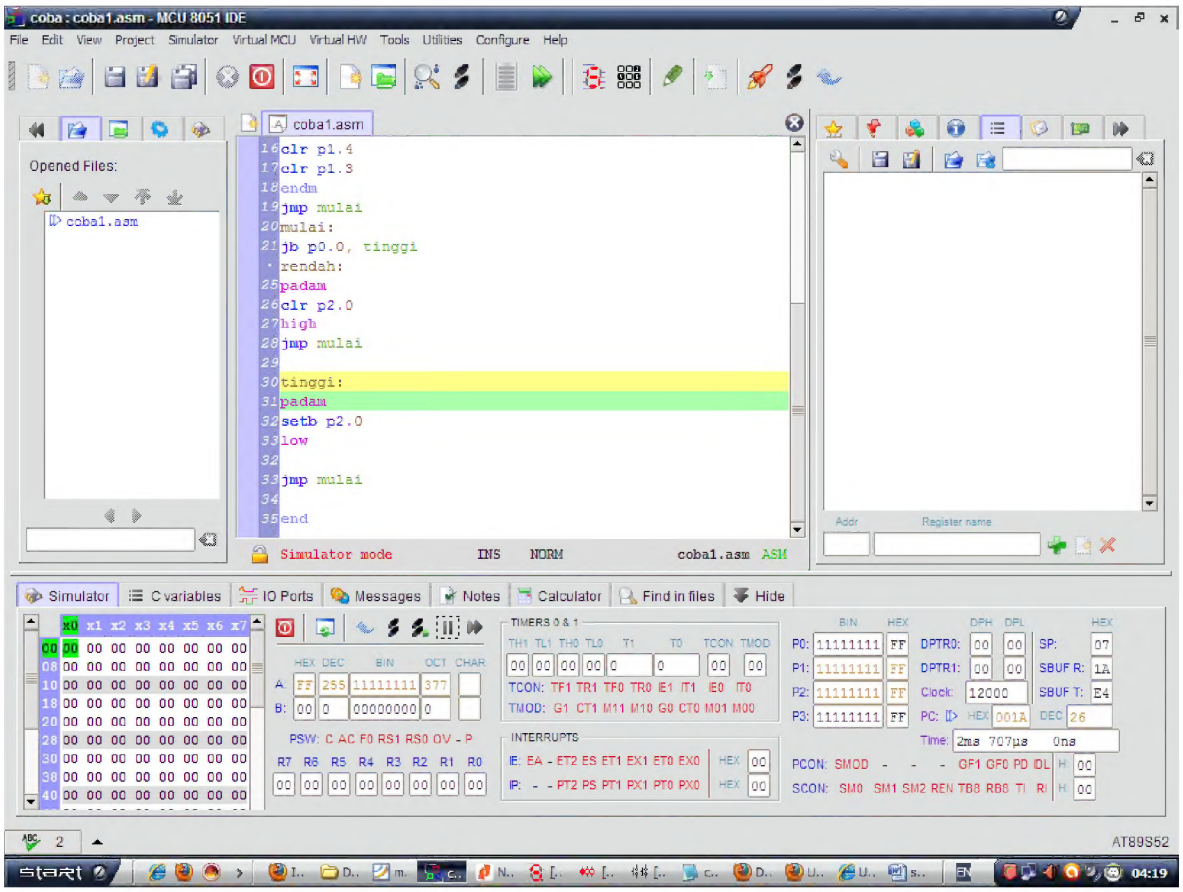

Figure 3: Print Screen GUI Program Controlling Simulator

To read input from sensors connected to P0.0, see figure 1 and 2 instruction JB P0.0 address (low or high) is used. If the logic input read at P0.0 is "0" then the program will jump to the label or address "low" and will turn on the display "H" on P1 and turn the LED at P2.0 on. However, if the logic input read at P0.0 is "1" then the program will jump to the label or address "high" and will display the character of the letter "L" in the P1 and turn the LED at P2.0 off.

Figure 3 above shows the GUI 8051 IDE used to develop the simulator in assembly language program. The full program of the simulator is shown below.

```
org 0h
padam macro
mov a,#0ffh
mov p1,a
endm
high macro
clr p1.1
clr p1.2
clr p1.4
clr p1.5
clr p1.6
endm



low macro
clr p1.5
clr p1.4
clr p1.3
endm

jmp mulai
mulai:
jb p0.0, tinggi
rendah:
padam
clr p2.0
high
jmp mulai

tinggi:
padam
setb p2.0
low

jmp mulai

end
```

CONCLUSIONS

From the results of the simulation and its implementation in the class a few thing can be observed,

- MCU 8051 can be used as an alternative media of control teaching in ALFHE class
- The assembly language of 8051 can be used to build up the simulation program
- The program runs according to the plan, and is stable
- The learning participants can immediately modify the program according to the needs or ideas that emerged in each group of study.

Closing

This article is expected to contribute to science, particularly in the areas of microcontroller, computer, and microcontroller or computer based control system engineering. And can be used as a media of learning in an active

learning model in higher education that will facilitate the study participants to master the subjects more fully and enable the teacher to carry out the teaching process better.

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